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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

STAICOVICI, STEFAN

ART UNIT

PAPER NUMBER

1732

DATE MAILED: 06/25/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/731,945

Examin r

Stefan Staicovici

Applicant(s)

WALDROP ET AL.

Art Unit

1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 2 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-12 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4, 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1 and 3-12, drawn to a vacuum molding process, classified in class 264, subclass 510.
 - II. Claim 2, drawn to a composite article, classified in class 428, subclass 297.4.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions Group I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process such as molding a resin pre-impregnated reinforcement under heat and pressure without the use of vacuum assisted resin flow.
 3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
 4. During a telephone conversation with Mr. John Hammar on September 4, 2001 a provisional election was made with traverse to prosecute the invention of Group I, claims 1 and 3-12. Affirmation of this election must be made by applicant in replying to this Office action. Claim 2 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.
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5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

6. The abstract of the disclosure is objected to because the Abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art. A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. Correction is required. See MPEP § 608.01(b).

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "Double Bag Vacuum Infusion Process."

Claim Objections

8. Claims 1 and 4-9 are objected to because of the following informalities:

- ✓ - in claim 1, line 5, before "preform", "tackifier" should be replaced with --tackified--
- ✓ - in claim 1, line 8, after "resin", "to" should be replaced with --into--
- ✓ - in claim 1, line 9, after "process", "." Should be inserted.
- ✓ - in claims 4 and 5, the limitation of "tilted at an angle off horizontal" is grammatically incorrect.

Claims 4-9 are objected to as dependent claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 4, 10 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 is dependent upon itself. It should be noted that for the purpose of examination it has been assumed that claim 4 depends from claim 1.

Claim 10 recites the limitations "the bagged perform assembly" in line 3 and "the flow media" in line 4. There is insufficient antecedent basis for these limitations in the claim. Further, the term "lowest point" in claim 10 is a relative term which renders the claim indefinite. The term "lowest point" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.

Claim 12 recites the limitation "the bagging" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

12. Claims 3 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Lang *et al.* (US Patent No. 6,406,659 B1).

Regarding claim 3, Lang *et al.* ('659) teach the claimed process of a vacuum assisted resin transfer molding process including, double bagging a reinforcement preform (193) with an inner bag (185) and an outer bag (189). It is submitted that vacuum integrity is improved since a double vacuum bag system is employed.

In regard to claim 9, Lang *et al.* ('659) teach the claimed process of a vacuum assisted resin transfer molding process including, providing a mold (183), positioning a reinforcement preform (193) onto said mold, positioning a layer of porous material onto said reinforcement preform (193) (see col. 6, lines 17-19) and double bagging said reinforcement preform with an inner bag (185) and an outer bag (189). Further, Lang *et al.* ('659) teach applying a vacuum

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between the two bags and injecting a resin between the inner bag and the top surface of said reinforcement preform (193). It is submitted that the injection resin is at least at atmospheric pressure since the compaction pressure is atmospheric pressure (see col. 6, lines 3-8).

13. Claim 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Palmer *et al.* (US Patent No. 4,942,013)

Palmer *et al.* ('013) teach the claimed process of a vacuum assisted resin infusion molding process in which the infusion of the resin occurs under a bagged assembly, said assembly including a fiber reinforced perform and a flow media (such that the resin flows against the gravitational force. It is submitted that since resin infusion occurs against gravity that improved control of the wavefront occurs since similar physical processes should provide similar physical results.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 1 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang *et al.* (US Patent No. 6,406,659 B1) in view of White *et al.* (US Patent No. 5,427,725).

Lang *et al.* ('659) teach the basic claimed process of molding a reinforcement including, providing a mold (183), positioning a reinforcement preform (193) onto said mold (assembling a perform from suitable reinforcement in a mold), double bagging said reinforcement preform with

an inner bag (185) and an outer bag (189), vacuum debulking said assembled preform and infusing resin into said debulked reinforcement perform using a vacuum-assisted resin transfer molding process (see col. 3, lines 7-23 and Figure 8). Further, Lang *et al.* ('659) teach a pressure differential between the inner bag (185) and the outer bag (189) that initially forms temporary resin flow channels which are and then collapsed against the top surface of said reinforcement perform (193). Hence, it is submitted that bag relaxation is controlled by the pressure differential between the inner bag (185) and the outer bag (189).

Regarding claim 1, Lang *et al.* ('659) do not teach tackifying the fiber reinforcement. White *et al.* (725) teach molding a fiber composite including, a first step of partially curing a tackified fiber reinforced composite and a second step of molding said tackified composite by impregnating said fiber reinforced matt with a resin and co-curing the tackifier and the resin to form the composite (see Abstract). It would have been obvious for one of ordinary skill in the art to have tackified the fiber reinforced preform as taught by White *et al.* ('725) in the process of Lang *et al.* ('659) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

In regard to claim 6, White *et al.* (725) teach a two-step molding process. Specifically, White *et al.* (725) teach that in the first step, the fiber reinforced matt is tackified at an elevated temperature of about 40 to 100 degrees C. In the second step, the heated tackified fiber reinforced matt is impregnated with resin in a mold to form a composite. Therefore, it would have been obvious for one of ordinary skill in the art to have first heated the fiber reinforced matt as taught by White *et al.* ('725) and then impregnated the heated tackified fiber reinforced matt

under vacuum in the process of Lang *et al.* ('659) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

Specifically regarding claim 7, White *et al.* (725) teach a first step of partially curing a tackified fiber reinforced composite at a temperature of about 40 to 100 degrees C. In the second step, the heated tackified fiber reinforced matt is impregnated with resin in a mold to form a composite. Further, Lang *et al.* ('659) teach vacuum debulking a preform and infusing resin into said debulked reinforcement perform using a vacuum-assisted resin transfer molding process (see col. 3, lines 7-23 and Figure 8). Therefore, it would have been obvious for one of ordinary skill in the art to have first heated the fiber reinforced matt as taught by White *et al.* ('725) and then debulked and impregnated the heated tackified fiber reinforced matt under vacuum in the process of Lang *et al.* ('659) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity and also because Lang *et al.* ('659) specifically teach that vacuum debulking reduces porosity, hence improving product quality.

Regarding claim 8, Lang *et al.* ('659) teach carbon fiber and epoxy resin (see col. 2, lines 54 and 68). White *et al.* (725) teach an epoxy resin tackifier (col. 4, lines 55-56). It would have been obvious for one of ordinary skill in the art to have tackified the fiber reinforced preform as taught by White *et al.* ('725) in the process of Lang *et al.* ('659) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing

stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity and also because, White *et al.* ('725) teach an epoxy tackifier used in conjunction with an epoxy molding resin (see col. 5, lines 55-60).

16. Claims 4-5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lang *et al.* (US Patent No. 6,406,659 B1) in view of White *et al.* (US Patent No. 5,427,725) and in further view of Imanara *et al.* (US Patent No. 5,364,584).

Lang *et al.* ('659) in view of White *et al.* (725) teach the basic claimed process as described above.

Regarding claims 4-5, Lang *et al.* ('659) in view of White *et al.* (725) do not teach an infusion direction that is tilted at an angle from the horizontal. Imanara *et al.* ('584) teach a molding process of a fiber reinforced matt including tilting the mold at an angle (see Figure 1). It would have been obvious for one of ordinary skill in the art to have tilted that mold assembly as taught by Imanara *et al.* ('584) in the process of Lang *et al.* ('659) in view of White *et al.* (725) because, Imanara *et al.* ('584) specifically teach that tilting reduces the amount of voids in the final molded article, hence improving resin impregnation and product quality (see col. 4, lines 55-65).

Further in regard to claim 5, and regarding claim 10, Imanara *et al.* ('584) teach that injection of resin occurs at a lower portion such that resin flows upwardly, hence against gravitation. Therefore, it would have been obvious for one of ordinary skill in the art to have injected resin at a lower portion of a mold such that resin flows against gravitation. as taught by Imanara *et al.* ('584) in the process of Lang *et al.* ('659) in view of White *et al.* (725) because, Imanara *et al.* ('584) specifically teach that tilting and injecting resin against gravitation reduces

the amount of voids in the final molded article, hence improving resin impregnation and product quality (see col. 4, lines 55-65).

17. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lang *et al.* (US Patent No. 6,406,659 B1) in view of White *et al.* (US Patent No. 5,427,725) and in further view of Stoeberl (US Patent No. 4,120,632).

Lang *et al.* ('659) in view of White *et al.* (725) teach the basic claimed process as described above.

Regarding claim 11, Lang *et al.* ('659) in view of White *et al.* (725) do not teach throttling the vacuum lines. Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9) throughout the fiber reinforcement (1) (see col. 4, lines 35-50). Therefore, it would have been obvious for one of ordinary skill in the art to have throttled vacuum lines as taught by Stoeberl ('132) in the process of Lang *et al.* ('659) in view of White *et al.* (725) because, Stoeberl ('132) specifically teaches that throttling of a vacuum line provides uniform resin distribution throughout the fiber reinforcement and reduces porosity by allowing air to escape, hence improving product quality.

18. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lang *et al.* (US Patent No. 6,406,659 B1) in view of Stoeberl (US Patent No. 4,120,632).

Lang *et al.* ('659) teach the basic claimed process as described above.

Regarding claim 12, Lang *et al.* ('659) do not teach throttling the vacuum lines. Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a

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mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9) throughout the fiber reinforcement (1) (see col. 4, lines 35-50). Therefore, it would have been obvious for one of ordinary skill in the art to have throttled vacuum lines as taught by Stoeberl ('132) in the process of Lang *et al.* ('659) because, Stoeberl ('132) specifically teaches that throttling of a vacuum line provides uniform resin distribution throughout the fiber reinforcement and reduces porosity by allowing air to escape, hence improving product quality.

19. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palmer *et al.* (US Patent No. 4,942,013) in view of Stoeberl (US Patent No. 4,120,632).

Palmer *et al.* ('013) teach the basic claimed process as described above.

Regarding claim 12, Palmer *et al.* ('013) do not teach throttling the vacuum lines. Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9) throughout the fiber reinforcement (1) (see col. 4, lines 35-50). Therefore, it would have been obvious for one of ordinary skill in the art to have throttled vacuum lines as taught by Stoeberl ('132) in the process of Palmer *et al.* ('013) because, Stoeberl ('132) specifically teaches that throttling of a vacuum line provides uniform resin distribution throughout the fiber reinforcement and reduces porosity by allowing air to escape, hence improving product quality.

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Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (703) 305-0396. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM and alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jan H. Silbaugh, can be reached at (703) 308-3829. The fax phone number for this Group is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Stefan Staicovici, PhD



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June 18, 2002
